

Claims

1. A method of producing particles having nano-sized grains, the method comprising the steps of:

(a) preparing a solution containing one or more metal cations;

5 (b) mixing the solution from step (a) with surfactant under conditions such that micelles are formed, and

(c) heating the mixture from step (b) above to form the particles.

2. A method as claimed in claim 1 wherein the particles are metal oxide particles.

10 3. A method as claimed in claim 1 further comprising the steps of treating the mixture from step (b) to form a gel and heating the gel to form the particles.

4. A method as claimed in claim 1 wherein the solution containing one or more metal cations is a concentrated solution of metal cations.

15 5. A method as claimed in claim 1 wherein the one or more metal cations are selected from the group consisting of metal cations from Groups 1A, 2A, 3A, 4A, 5A, and 6A of the Periodic Table, transition metals, lanthanides and actinides, and mixtures thereof.

6. A method as claimed in claim 1 wherein the surfactant is mixed with the solution such that micellar liquid is formed.

20 7. A method as claimed in claim 1 wherein the surfactant is selected from the group consisting of non-ionic surfactants, cationic surfactants, anionic surfactants and zwitterionic surfactants.

8. A method as claimed in claim 1 wherein step (c) comprises heating the mixture to a maximum applied temperature not exceeding 600°C.

9. A method as claimed in claim 8 wherein the maximum applied temperature does not exceed 450°C.

25 10. A method as claimed in claim 8 wherein the maximum applied temperature does not exceed 300°C.

11. A method as claimed in claim 1 wherein the grain size of the particles fall within the range of 1-50nm.

12. A method as claimed in claim 11 wherein the grain size falls within the range of 1-20nm.

5 13. A method as claimed in claim 11 wherein the grain size falls within the range of 2-10nm.

14. A method as claimed in claim 11 wherein the grain size falls within the range of 2-8nm.

10 15. A method as claimed in claim 1 wherein the particles are substantially crystalline and contain only small or negligible amounts of amorphous material.

16. Metal oxide particles characterised in that the particles have a grain size substantially in the range from 1-50nm.

17. Particles as claimed in claim 16 wherein the grain size falls within the range of 1-20nm.

15 18. Particles as claimed in claim 16 wherein the grain size falls within the range of 2-10nm.

19. Particles as claimed in claim 16 wherein the grain size falls within the range of 2-8nm.

20 20. Particles as claimed in claim 16 wherein the metal oxide includes one or more metals selected from Groups 1A, 2A, 3A, 4A, 5A, and 6A of the Periodic Table, transition metals, lanthanides, actinides and mixtures thereof.